

Amendments to the Specification:

Please replace paragraph [0002] with the following amended paragraph:

CROSS-REFERENCES TO RELATED APPLICATIONS

[0002] This patent application is a Continuation-in-Part of U.S. Patent Application No. 10/602,442, filed June 24, 2003, which is a Continuation of U.S. Patent Application No. 10/028,844, filed December 20, 2001, which claims priority to Provisional Patent Application No. 60/258,341, filed December 27, 2000, and is also a Continuation-in-Part of U.S. Patent Application Nos. ~~10/177,572~~ 10/177,572, filed June 21, 2002, 10/091,056, filed March 4, 2002, and 10/028,844, filed December 20, 2001, which all claim priority to Provisional Patent Application ~~S/N~~ No. 60/258,341, filed December 27, 2000.

Please replace paragraphs [0045], [0046], [0047], [0048], [0049], [0050], [0051], and [0052], that include aspects 1-8, with paragraphs [0045], [0046], [0047], [0048], [0049], [0050], [0051], and [0052], that include new aspects 1-8:

[0045] In a first aspect of the present invention, an electronic apparatus comprises: a solid-state electronic device that includes higher and lower dc voltage terminals; an other electronic device that includes higher and lower dc voltage terminals; means, comprising means for connecting the lower dc voltage terminal of one of the electronic devices to the higher dc voltage terminal of an other of the electronic devices, for connecting the electronic devices in dc series between a dc source terminal and an electrical ground; means, comprising a capacitor that is connected between the lower dc voltage terminal of the one electronic device and the electrical ground, for rf decoupling the dc series-connected electronic devices; and the means for rf decoupling further comprises means for making an effective series resistance, between the lower dc voltage terminal of the one electronic device and the electrical ground, lower than a porcelain capacitor that resonates at an rf frequency of the one electronic device.

[0046] In a second aspect of the present invention, electronic apparatus comprises: a first electronic device that includes higher and lower dc

voltage terminals; a second electronic device that includes higher and lower dc voltage terminals; means, comprising means for connecting the lower dc voltage terminal of one of the electronic devices to the higher dc voltage terminal of an other of the electronic devices, for connecting the electronic devices in dc series between a dc source terminal and an electrical ground; means for proportioning first and second percentages of a dc source voltage, when applied to the dc source terminal, to the first and second electronic devices, respectively; means, comprising a capacitor that is connected between the lower dc voltage terminal of the one electronic device and the electrical ground, for rf decoupling the dc series-connected electronic devices; and the means for rf decoupling further comprises means for making an effective series resistance, between the lower dc voltage terminal of the one electronic device and the electrical ground, lower than a porcelain capacitor that resonates at an rf frequency of the one electronic device.

[0047] In a third aspect of the present invention, electronic apparatus comprises: a baseband processing device having higher and lower dc voltage terminals; a solid-state electronic device, having higher and lower dc voltage terminals; means for delivering an rf signal from the baseband processing device to the solid-state electronic device; means, comprising means for connecting the lower dc voltage terminal of one of the devices to the higher dc voltage terminal of an other of the devices, for connecting the devices in dc series between a dc source terminal and an electrical ground; means for proportioning first and second percentages of a dc supply voltage, when applied to the dc source terminal, to respective ones of the devices; and means, comprising a capacitor that is connected between the lower dc voltage terminal of the one electronic device and the electrical ground, for rf decoupling the dc series-connected electronic devices.

[0048] In a fourth aspect of the present invention, electronic apparatus comprises: a baseband processing device having higher and lower dc voltage terminals; a multiplier/up-converter being connected in rf series to the baseband processing device; a solid-state amplifying device having higher and lower dc voltage terminals; means for connecting the solid-state amplifying device in rf series to the multiplier/up-converter; means, comprising means for connecting

the lower dc voltage terminal of the solid-state amplifying device to the higher dc voltage terminal of the baseband processing device, for connecting the solid-state amplifying device and the baseband processing device in dc series between a dc source terminal and an electrical ground; means for proportioning first and second percentages of a dc supply voltage, when applied to the dc source terminal, to the solid-state amplifying device and to the baseband processing device, respectively; and means, comprising a capacitor that is connected between the lower dc voltage terminal of the solid-state amplifying device and the electrical ground, for rf decoupling the solid-state amplifying device and the baseband processing device.

[0049] In a fifth aspect of the present invention, a method for processing rf signals comprises: connecting a solid-state electronic device and an other electronic device in dc series between a dc source voltage and an electrical ground; the connecting step comprises connecting a lower dc voltage terminal of one of the electronic devices to an rf choke, and connecting the rf choke to a higher dc voltage terminal of an other of the electronic devices; separately processing rf signals in the electronic devices; proportioning first and second percentages of the dc source voltage to separate ones of the electronic devices; rf decoupling the electronic devices; and the rf decoupling step comprises providing a capacitance between the lower dc voltage terminal and the electrical ground that is lower than an effective series resistance of a porcelain capacitor that resonates at an rf frequency of the one electronic device.

[0050] In a sixth aspect of the present invention, a method for processing rf signals comprises: connecting first and second electronic devices in dc series between a dc source voltage and an electrical ground; separately processing rf signals in the first and second electronic devices; proportioning first and second percentages of the dc source voltage between the first and second electronic devices; rf decoupling the electronic devices; and the rf decoupling step comprises providing a capacitance, between a lower dc voltage terminal of an upper one of the electronic devices and the electrical ground, that is lower than an effective series resistance of a porcelain capacitor that resonates at an rf frequency of the first electronic device.

[0051] In a seventh aspect of the present invention, a method for processing rf signals comprises: rf connecting a baseband processing device and a solid-state electronic device; connecting the solid-state electronic device and the baseband processing device in dc series between a dc source terminal and an electrical ground; the dc series-connecting step comprises connecting a lower dc voltage terminal of one of the devices to a higher dc voltage terminal of an other of the devices; applying a dc source voltage to the dc source terminal; separately proportioning first and second percentages of the dc source voltage to the devices; rf decoupling the devices; and the rf decoupling step comprises connecting a capacitor between the lower dc voltage terminal of the one device and the electrical ground.

[0052] In an eighth aspect of the present invention, a method for processing rf signals comprises: rf connecting a baseband processing device to a multiplier/up-converter; rf connecting the multiplier/up-converter to a solid-state amplifying device; connecting the solid-state amplifying device and the baseband processing device in dc series with a dc source terminal and an electrical ground; the dc series-connecting step comprises connecting a lower dc voltage terminal of the solid-state amplifying device to an rf choke, and connecting the rf choke to a higher dc voltage terminal of the baseband processing device; applying a dc source voltage to the dc source terminal; proportioning first and second percentages of the dc source voltage to separate ones of the devices; rf decoupling the solid-state amplifying device and the baseband processing device; and the rf decoupling step comprises connecting a capacitor between the lower dc voltage terminal and the electrical ground.

Please delete paragraphs [0053], [0054], [0055], and [0056], that include aspects 9-12, which have been canceled.

Please replace paragraphs [0063], [0066], [0068], and [0070] with the following amended paragraphs:

[0063] FIGURE 7 is a power-shifting rf amplifier, electronic apparatus, or a shared-current electronic system, in which two solid-state electronic devices are connected in series between higher and lower ~~dc source voltages~~

dc source voltages or supply voltages, in which rf signals, which may be in quadrature, are separately amplified in the solid-state electronic devices, and in which the rf power is selectively shifted and proportioned between two separate rf outputs in response to a proportioning-control voltage;

[0066] FIGURE 10 is a variable power-shifting rf amplifier, ~~or a shared-current electronic system~~ or power-switching amplifier, in which four solid-state electronic devices are connected in series between higher and lower ~~dc source-voltages~~ dc source voltages or supply voltages to utilize the dc source voltage ~~[[is]]~~ in variably selected proportions, in which ~~0.0, 90.0, 180.0, and 270.0 degree~~ 0, 90, 180, and 270 degree rf signals are separately amplified in the four solid-state electronic devices, and the rf power is selectively proportioned, or selectively switched, among four rf outputs in response to the three proportioning voltages that are generated by the ~~proportional control~~ proportioning control, of ~~FIGURE 10~~ FIGURE 11, that is an integral part of the power-shifting rf amplifier of ~~FIGURE 9~~ FIGURE 10;

[0068] FIGURE 12 illustrates an operational amplifier being used as a buffer to prevent current-caused changes in a bias voltage for the shared-current electronic systems of ~~FIGURES 1-5, 16-18, and 20-22~~ FIGURES 1-5 and 16-21;

[0070] FIGURE 14 is a a model for simulating a microwave capacitor;

Please delete paragraph [0075].

Please replace paragraphs [0076], [0077], [0078], [0079], [0084], [0096], [0098], [0105], [0107], [0110], [0118], [0126], [0129], [0130], [0136], [0138], [0139], [0141], [0144], [0147], [0152], [0153], [0165], [0166], [0169], [0172], [0178], [0180], [0182], [0185], [0186], [0188], [0189], [0191], [0192], and [0194] with the following amended paragraphs:

[0076] ~~FIGURE 20~~ FIGURE 19 is a frequency-compression electronic system, ~~or a shared-current electronic system~~, in which an rf output GaAsFET shares current with a ~~baseband converter~~ baseband processing device, a ~~multiplier/upconverter~~ multiplier/up-converter, a gain block, and a driver GaAsFET;

[0077] ~~FIGURE 21~~ FIGURE 20 is a frequency-compression electronic system, or a shared-current electronic system, in which the rf output GaAsFET of ~~FIGURE 20~~ FIGURE 19 is replaced by a MOSFET; and

[0078] ~~FIGURE 22~~ FIGURE 21 is a frequency-compression electronic system, or a shared-current electronic system, in which the rf output GaAsFET of ~~FIGURE 20~~ FIGURE 19 is replaced by a bipolar-junction transistor.

[0079] Referring now to FIGURE 1, an rf power amplifier, or shared-current electronic system, 10 includes solid-state amplifying devices, solid-state electronic devices, n-channel gallium arsenide field-effect transistors, GaAsFETs, or FETs, Q1 and Q2 that are connected in series between a positive supply voltage, or source voltage, V_{DC} and an electrical ground.

[0084] Continuing to refer to FIGURE 1, if the supply voltage is 22.0 volts dc, and if the resistor R1 provides a 2.0 voltage drop between the source terminal of the FET Q2 and the ground, assuming equal current through the FETs, Q1 and Q2, the remaining 20.0 volts will be equally divided, thereby providing 10.0 volts for each FET, Q1 and Q2, with the FET Q1 having 22.0 volts applied to the drain terminal and 12.0 volts applied to the source terminal.

[0096] If a 56.0 volt dc source voltage is equally divided, the base voltage for the BJT Q5 is adjusted to 28.7 volts by the variable voltage divider VD1, so that the base of the BJT Q5 is 0.7 volts above its emitter voltage. In like manner, the variable voltage divider VD2 is adjusted to 0.7 volts, so that the base of the ~~BJT Q4~~ BJT Q6 is 0.7 volts above its grounded emitter.

[0098] Referring now to FIGURE 4, an rf power amplifier, or shared-current electronic system, 30 includes like-named, like-numbered, and like-functioning parts as those of FIGURE 1. In addition, the rf power amplifier 30 includes a FET Q7 that is in a current-sharing arrangement with the FETs Q1 and Q2, so that the FETs Q1, Q2, and Q7 share the supply voltage. The FET Q7 is connected as a driver for the FETs Q1 and Q2.

[0105] Referring now to FIGURE 5, an rf power amplifier, or shared-current electronic system, 38 includes like-named and like-numbered components as those shown in FIGURE 4. However, a voltage controlled oscillator, or VCO, 40 includes ~~a driver~~ the driver FET Q7, the resistor R5, the

rf choke L7, ~~a coupling capacitor C10~~ the coupling capacitor C8, an rf choke L8, and a varactor VC1. The VCO 40 produces an rf output signal that is varied in frequency by changing a control voltage V_C that is applied to the varactor VC1. Optionally, the current drain of the VCO 40 may be increased by connecting jumper terminals 42, thereby connecting the decoupling capacitor C9 between a source terminal of the FET Q7 and the electrical ground to increase the ~~VCO~~ output power of the VCO 40.

[0107] Referring now to FIGURE 6, a variable phase-shifting rf power amplifier, or shared-current electronic system, 48 includes solid-state amplifying devices, solid-state electronic devices, field-effect transistors, or FETs, Q1 and Q2, that are connected in series between a higher-voltage, ~~or dc source voltage~~ dc source voltage, or supply voltage V_{DC} , and a lower voltage, source voltage, or supply voltage, or an electrical ground. That is, the rf choke L1 connects the ~~dc source voltage~~ dc source voltage V_{DC} to ~~[[a]]~~ the drain terminal of the FET Q1, the rf choke L2 connects ~~[[a]]~~ the source terminal of the FET Q1 to the drain terminal of the FET Q2, and the resistor R1 connects the source terminal of the FET Q2 to ~~[[a]]~~ the electrical ground, as described in conjunction with FIGURE 1.

[0110] In operation, an ~~rf input signal~~ rf input RF_{IN} of the variable phase-shifting rf power amplifier ~~[[10]]~~ 48 is phase split in the rf power splitter 12, into rf signals that are ~~phase-shifted~~ phase shifted by 0 and 90 degrees, are amplified in the FETs Q1 and/or Q2 in selected proportions, and are combined in the rf power combiner 14 to provide a power amplified output at an rf output terminal RF_{OUT} that is selectively ~~phase-shifted~~ phase shifted.

[0118] Referring now to FIGURE 7, a power-shifting rf amplifier, ~~or power-switching rf amplifier,~~ or shared-current electronic system, 66 includes like-named and like-numbered parts as shown and described in conjunction with FIGURE 6, except that the in-phase combiner 52 has been omitted, so the power-shifting rf amplifier 66 has two rf outputs, $RF1_{OUT}$ and $RF2_{OUT}$.

[0126] Referring now to FIGURE 8, a variable phase-shifting rf power amplifier, or shared-current electronic system, 70 has a phase-shift range of ~~270.0 degrees~~ 270 degrees, as opposed to ~~90.0 degrees~~ 90 degrees for the variable phase-shifting rf power amplifier 48 of FIGURE 6. The variable phase-

shifting rf power amplifier 70 includes a proportioning control 72 that generates proportioning voltages V_{P1} , V_{P2} , and V_{P3} in response to a proportioning control voltage V_{PC} . Construction of the proportioning control 72 is described in conjunction with FIGURE 10.

[0129] Also, as shown in FIGURE 8, the 180 degree output of the 180 degree power splitter 74 is connected to the input of the 90 degree power splitter 76B, so that the output at the 0 degree output of the 90 degree power splitter 76B is not shifted additionally, but remains at 180 degrees. However, the other rf output of the 90 degree power splitter 76B is ~~phase-shifted~~ phase shifted an additional 90 degrees from that of the 180 degree output of the ~~180 degree power splitter 74~~ 180 degree power splitter 74, to 270 degrees.

[0130] Referring now to FIGURES 8 and 9, an rf signal 80A of FIGURE 9 that is not ~~phase-shifted~~ phase shifted is provided by the 0 degree output of the 90 degree power splitter 76A, an rf signal 80B ~~that is phase-shifted~~ that is phase shifted 90 degrees is provided at the 90 degree output of the ~~90 degree power splitter 76B~~ 90 degree power splitter 76A, an rf signal 80C that is ~~phase-shifted~~ phase shifted by 180 degrees is provided at the 0 degree output of the 90 degree power splitter 76B, and an rf signal 80D that is ~~phase-shifted~~ phase shifted 270 degrees is provided at the 90 degree output of the 90 degree power splitter 76B.

[0136] The proportioning control 72 produces the ~~power-shifting~~ proportioning voltages V_{P1} , V_{P2} , and V_{P3} in response to ~~[[a]] the~~ proportioning control voltage V_{PC} . The rf output RF2_{OUT} is at ~~90.0 degrees~~ 90 degrees to the rf output RF1_{OUT}, the rf output RF3_{OUT} is at ~~180.0 degrees~~ 180 degrees to the rf output RF1_{OUT}, and the rf output RF4_{OUT} is at ~~270.0 degrees~~ 270 degrees to the rf output RF1_{OUT}.

[0138] Assuming a 10.0 volts dc source, the amplifiers, U1, U2, and U3, are biased to start amplifying at proportioning voltages V_P of ~~0.0, 2.5, 5.0, and 7.5~~ 0.0, 2.5, 5.0, 7.5, and 10.0 volts respectively, ~~so that proportioning~~ voltages V_P of 0.0, 2.5, 5.0, 7.5, and 10.0 volts produce phase angles of 0.0, 45.0, 90.0, 135.0, and 180.0 degrees, respectively.

[0139] ~~More particularly, in~~ In response to a ~~proportioning voltage~~ proportioning-control voltage V_{PC} of 0.0 volts, the proportioning control 72

produces proportioning voltages, V_{P1} , V_{P2} , and V_{P3} , of 0.0 volts dc. In response to increases in the ~~phase-control voltage~~ proportioning-control voltage V_{PC} , the proportioning voltage V_{P1} increases to 10.0 volts while keeping the proportioning voltages V_{P2} and V_{P3} at 0.0 volts dc.

[0141] Although a detailed construction has been shown and described, the proportioning control 72 is representative of any device, analog or digital, that will produce the proportioning voltages V_{P1} , V_{P2} , and V_{P3} in response to an analog or digital input $[[V_{PC}]]$, vary the proportioning voltages V_{P1} , V_{P2} , and V_{P3} in whatever manner is useful for a particular application, and vary them in whatever time frame may be desirable or suitable for an intended use in either the phase-shifting rf amplifier 70 of FIGURE 8 or the power-shifting rf amplifier 82 of FIGURE 10.

[0144] Referring now to FIGURE 12, an operational amplifier OP1, that is configured as a buffer, has been inserted between the variable voltage divider VD1 and the rf choke L3. Preferably, the operational amplifier OP1 is used in conjunction with the variable voltage divider VD1 in FIGURES 1-5 and ~~16-21~~ 16-18, and 20-22. Also, preferably, the operational amplifier OP1 is used in conjunction with the variable voltage divider VD2 of FIGURES 2-4 ~~FIGURES 2-5~~, being interposed between the potentiometer 22 and the rf choke L5.

[0147] At operation below the self-resonant frequency, the impedance of an inductor increases as frequency increases. At the inductor self-resonant frequency, the inductor, as represented by the parallel L/C circuit of ~~FIGURE 12~~ FIGURE 13, resonates as an open circuit creating a maximum impedance to the rf signal. At operation higher than the self-resonant frequency, the distributed capacitance of the capacitor C dominates the rf impedance resulting in the impedance decreasing with increasing frequency. The inductor self-resonant frequency is $F_{SR} = 1/[2\pi\sqrt{LC}]$.

[0152] These parasitic effects of a capacitor at microwave frequencies alter its impedance characteristics in the opposite manner as that of an inductor. At operation below the self-resonant frequency, a capacitor decreases in impedance as frequency increases. At the capacitor self-resonant frequency, a capacitor, as represented by the series L/C circuit of ~~FIGURE 13~~ FIGURE 14,

resonates as a short circuit, creating a minimum impedance to the rf signal. At frequencies higher than the self-resonant frequency, the lead and plate inductance L dominates the rf impedance, resulting in the impedance increasing with increasing frequency. The capacitor self-resonant frequency equation is $F_{SR} = 1/[2\pi*\sqrt{(LC)}]$, which is the same as for the inductor.

[0153] The rf impedance of a capacitor at self-resonant frequency is equal to the effective series resistance (ESR). As in the case of the inductor, the quality factor Q of a capacitor is the ratio of ~~[[a]]~~ the capacitor's reactance to its ESR, or alternately the quality factor Q is 1/DF, where DF is the dissipation factor of the capacitor. High-Q capacitors, with very low ESR, have very low self-resonant impedances, but for only a narrow bandwidth. Lower-Q capacitors, with higher ESR, have lower self-resonant impedances for a much broader bandwidth. Presently, the preferred capacitor dielectric to minimize capacitor ESR is porcelain. Porcelain has a dissipation factor, DF, of 0.00007, the lowest of all currently available capacitor dielectrics.

[0165] Series 600S capacitors that are available from ~~American Technical Ceramies~~ American Technical Ceramics, their ~~self-resonant self-resonant~~ frequencies, their capacities, and their effective series resistances, are included in the following table.

[0166]

Table 1: Porcelain Capacitors
Self-Resonant Frequencies vs. ESRs

| <u>Self-Resonant Freq.</u> | <u>Capacitance</u> | <u>ESR</u> |
|------------------------------------|----------------------------------|------------|
| 1.0 [[Ghz]] <u>GHz</u> | 100.0 pF | 0.07 ohms |
| 2.0 [[Ghz]] <u>GHz</u> | 40.0 [[pf]] <u>pF</u> | 0.09 ohms |
| 4.0 [[Ghz]] <u>GHz</u> | 15.0 pF | 0.15 ohms |
| 8.0 [[Ghz]] <u>GHz</u> | 3.0 pF | 0.20 ohms |
| 16.0 [[Ghz]] <u>GHz</u> | 1.0 pF | 0.30 ohms |

[0169] Referring now to FIGURE 16, a shared-current electronic system, 90 includes like-named and like-numbered parts as those of FIGURE 1, except that the GaAsFET Q2, with its associated parts, is omitted, and the GaAsFET Q1 is connected in series with a processing electronic device, or baseband processing device, 92, between ~~[[a]]~~ the dc supply voltage V_{DC} and a ground.

[0172] If a current flow requirement for the processing electronic device 92 is greater than that of the GaAsFET Q1, then the resistor R15 can be connected to shunt current around the GaAsFET Q1. Or, if the current flow requirement for the GaAsFET Q1 is greater than that of the processing electronic device 92, then the resistor R16 can be connected to shunt current flow around the processing electronic device 92.

[0178] As noted above, SOQPSK is a high spectral efficiency method of modulation that compresses more data into a given bandwidth than conventional methods of modulation. Unfortunately, from a power-consumption standpoint, it is highly inefficient. However, power efficiency is increased tremendously by sharing current of the SOQPSK components with the GaAsFET Q1 that produces the rf output. The power efficiency is further improved by sharing the current flow of the GaAsFET Q1 with a gain block Q11. The gain block Q11, is a solid-state amplifying device, or solid state electronic device. ~~and a driver GaAsFET Q12.~~

[0180] ~~[[In]]~~ Referring now to Figure 19, a SOQPSK system, or shared-current electronic system, 108, includes a baseband processor, baseband processing device, or processing electronic device, 110, a ~~multiplier/upconverter~~ multiplier/up-converter, or processing electronic device, 112 and two solid-state amplifying devices, or solid-state electronic devices, Q11 and Q12 that are connected in dc parallel with each other, so that the total current used by these four electronic devices flows through a conductor 114. The electronic device Q11 is a gain block (a chip that includes two bipolar-junction transistors), and the electronic device Q12 is a GaAsFET that is used as a driver for the FET Q1. Both electronic devices, Q11 and Q12, provide preamplification for the FET Q1. While the gain block Q11 and the GaAsFET Q12 have been shown, any mixture of solid-state devices, such as gain blocks, BJTs, J-FETs, or MOSFETs, can be used for preamplification, as long as proper bias is provided.

[0182] Not only are the baseband processor 110, the ~~multiplier/upconverter~~ multiplier/up-converter 112, the gain block Q11, and the GaAsFET Q12 all in dc parallel, they are also all in dc series with the FET Q1. Therefore, the baseband processor 110, ~~the multiplier/upconverter~~ multiplier/up-

converter 112, the gain block Q11, and the GaAsFET Q12 all share current to the GaAsFET Q1 through the conductor 114, thereby greatly increasing the overall power efficiency of the ~~SOQPSK system 104~~ SOQPSK system 108.

[0185] Referring now to ~~FIGURE 21~~ FIGURE 20, a spectrally efficient system, electronic apparatus, or a shared-current electronic system, 118 includes ~~[[a]]~~ the MOSFET Q3 that is connected in dc series with the baseband processor 110 and the ~~multiplier/up-converter~~ multiplier/up-converter 112 of ~~FIGURE 20~~ FIGURE 19.

[0186] Except for replacing the GaAsFET Q1 of ~~FIGURE 20~~ FIGURE 19 with the MOSFET Q3 of ~~FIGURE 21~~ FIGURE 20, the ~~spectrally efficient system 118~~, and except for changes relating to providing a bias for the MOSFET Q3, the systems, 108 and 118, are the same. Therefore, operation of the spectrally efficient system 118 can be understood by reading the description of the spectrally efficient system 108 of ~~FIGURE 20~~ FIGURE 19.

[0188] Referring now to ~~FIGURE 22~~ FIGURE 21, a spectrally efficient system, SOQPSK spectrally efficient system, or a shared-current electronic system, 122 includes components as shown and described in conjunction with ~~FIGURE 20~~ FIGURE 19, except that the GaAsFET Q1 of ~~FIGURE 20~~ FIGURE 19 has been replaced with the bipolar-junction transistor Q5.

[0189] Referring finally to ~~FIGURES 20, 21, and 22~~, FIGURES 19, 20, and 21, and considering the number and types of electronic devices, 110, 112, Q11, and Q12, that are connected in dc parallel to each other and in series with the output power device, the GaAsFET Q1, the MOSFET Q3, or the bipolar-junction transistor Q5, it can be understood that once the source of the FET, Q1 or Q3, or the emitter of the bipolar-junction transistor Q5 is decoupled, anything that involves rf signals of the same frequency, or different frequencies, can be connected in series with the GaAsFET Q1, the MOSFET Q3, or the bipolar-junction transistor Q5, provided that the decoupling and rf choking network works for all frequencies in the system.

[0191] In summary, the present invention can be characterized as providing ~~rf power amplifiers~~, apparatus both constant and variable power, in which at least one ~~solid-state current device~~ solid-state electronic device and at least one other electronic device, whether a ~~solid-state current device~~ solid-state

electronic device or a processing electronic device, fixedly or dividingly share the supply voltage and share the same current, and in which a single rf output, or a plurality of rf outputs, are produced.

[0192] Further, the present invention can be characterized as providing ~~rf power amplifiers~~ apparatus in which two or more rf outputs may be variably phase shifted, in which the total rf output may be variably shifted between/among a plurality of rf outputs, or in which the total rf power may be switched between/among a plurality of rf outputs, all without substantially varying the total rf power, and bandwidth compression is achieved with improved power efficiency.

Please add the following new paragraph after paragraph [0193]:

[0193.1] As can be seen in FIGURE 8, two solid-state electronic devices, such as the FETs Q2 and Q9, are connected in dc series between the source voltage V_{DC} and an electrical ground, even though one is connected indirectly to the source voltage V_{DC} and the other is connected indirectly to the electrical ground. Further, as can be seen in FIGURE 2, one solid-state electronic device, such as the FET Q3, is connected to a higher dc voltage, and an other solid-state electronic device, such as the FET Q4, is connected to a lower dc voltage, even though the FET Q3 is connected directly to the source voltage V_{DC} and the FET Q4 is connected directly to the electrical ground.

Please replace paragraph [0194] with the following amended paragraph:

[0194] While specific apparatus and method have been disclosed in the preceding description, and while representative ones of component numbers have been inserted parenthetically in some of the claims, it should be understood that these specifics have been given for the purpose of disclosing the principles of the present invention, and that many variations thereof will become apparent to those who are versed in the art. Therefore, the scope of the present invention is to be determined by claims included appended hereto without any limitation by numbers that may be parenthetically inserted in the claims.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

What is claimed is:

1 (currently amended). Electronic apparatus (10, 20, 26, 30, 38, 48, 66, 70, 82, 90, 96, 100, 108, 118, or 122) which comprises:

a solid-state electronic device (Q1, Q3, or Q5) that includes higher and lower dc voltage terminals;

an other electronic device (Q2, Q4, Q6, Q7, Q8, 92, 110, 112, Q11, or Q12) that includes higher and lower dc voltage terminals;

means, comprising means (L2) for connecting said lower dc voltage terminal of one of said electronic devices to said higher dc voltage terminal of an other of said electronic devices, for connecting said electronic devices in dc series between a dc source terminal and an electrical ground;

means, comprising a capacitor (~~C5, C6, C9, C10, C18, or C19~~) (C5, C6, or C19) that is connected between said lower dc voltage terminal of said one electronic device and said electrical ground, for rf decoupling said dc series-connected electronic devices; and

said means for rf decoupling further comprises means (86) for making an effective series resistance, between said lower dc voltage terminal of said one electronic device and said electrical ground, lower than a porcelain capacitor that resonates at an rf frequency of said one electronic device.

2 (currently amended). Electronic apparatus (~~10, 20, 26, 30, 38, 48, 66, 70, 82, 90, 96, 100, 108, 118, or 122~~) (48, 66, 70, 82, 90, 96, 100, 108, 118, or 122) which comprises:

a first electronic device (Q1, Q3, or Q5) that includes higher and lower dc voltage terminals;

a second electronic device (Q2, Q4, Q6, 92, 110, 112, Q11, or Q12) that includes higher and lower dc voltage terminals;

means, comprising means (L2) for connecting said lower dc voltage terminal of one of said electronic devices to said higher dc voltage terminal of an other of said electronic devices, for connecting said electronic devices in dc series between a dc source terminal and an electrical ground;

means ~~(VD4)~~ (54, 72, or VD1) for proportioning first and second percentages of a dc source voltage, when applied to said dc source terminal, to said first and second electronic devices, respectively;

means, comprising a capacitor ~~(C5 or C6)~~ (C5, C6, or C19) that is connected between said lower dc voltage terminal of said one electronic device and said electrical ground, for rf decoupling said dc series-connected electronic devices; and

said means for rf decoupling further comprises means (86) for making an effective series resistance, between said lower dc voltage terminal of said one electronic device and said electrical ground, lower than a porcelain capacitor that resonates at an rf frequency of said one electronic device.

3 canceled

4 canceled

5 (currently amended). ~~An electronic system~~ Electronic apparatus (108, 118, or 122) which comprises:

a baseband processing device (110) having higher and lower dc voltage terminals;

a solid-state electronic device (Q1, Q2, or Q3), having higher and lower dc voltage terminals;

means (112, Q11, Q12) for delivering an rf signal from said ~~baseband processor~~ baseband processing device to said solid-state electronic device;

means, comprising means (L2) for connecting said lower dc voltage terminal of one of said devices to said higher dc voltage terminal of an other of said devices, for connecting said devices in dc series between a dc source terminal and an electrical ground;

means (VD1) for proportioning first and second percentages of a dc supply voltage, when applied to said dc source terminal, to respective ones of said devices; and

means, comprising a capacitor (C5 or C19) that is connected between said lower dc voltage terminal of said one ~~electronic devices~~ electronic device and said electrical ground, for rf decoupling said dc series-connected electronic devices.

6 (currently amended). Electronic apparatus (108, 118, or 122) which comprises:

a baseband processing device (110) having higher and lower dc voltage terminals ~~(110)~~;

a ~~multiplier/upconverter~~ multiplier/up-converter (112) being connected in rf series to said ~~baseband processor~~ baseband processing device;

a solid-state amplifying device (Q1, Q3, or Q5) having higher and lower dc voltage terminals;

means (Q11, Q12) for connecting said solid-state amplifying device in rf series to said ~~multiplier/upconverter~~ multiplier/up-converter;

means, comprising means (L2) for connecting said lower dc voltage terminal of said solid-state amplifying device to said higher dc voltage terminal of said baseband processing device, for connecting said solid-state amplifying device and said baseband processing device in dc series between a dc source terminal and an electrical ground;

means (VD1) for proportioning first and second percentages of a dc supply voltage, when applied to said dc source terminal, to said solid-state amplifying device and to said baseband processing device, respectively; and

means, comprising a capacitor (C5) that is connected between said lower dc voltage terminal of said solid-state amplifying device and said electrical ground, for rf decoupling said solid-state amplifying device and said baseband processing device.

7 (currently amended). A method for processing rf signals which comprises:

- a) connecting a solid-state electronic device and an other electronic device in dc series between a dc source voltage and an electrical ground;
- b) said connecting step comprises connecting a lower dc voltage terminal of one of said electronic devices to an rf choke, and connecting said rf choke to a higher dc voltage terminal of an other of said electronic devices;
- c) separately processing rf signals in said ~~first and second~~ electronic devices;
- d) proportioning first and second percentages of said dc source voltage to separate ones of said electronic devices;
- e) rf decoupling said electronic devices; and
- f) said rf decoupling step comprises providing a capacitance between said lower dc voltage terminal and said electrical ground that is lower than an effective series resistance of a porcelain capacitor that resonates at an rf frequency of said ~~first~~ one electronic device.

8 (currently amended). A method for processing rf signals which comprises:

- a) connecting first and second electronic devices in dc series between a dc source voltage and an electrical ground;
- b) separately processing rf signals in said first and second electronic devices;
- c) proportioning first and second percentages of said dc source voltage between said first and second electronic devices;
- d) rf decoupling said electronic devices; and
- e) said rf decoupling step comprises providing a capacitance, between a lower dc voltage terminal of an upper one of said electronic devices and said electrical ground, that is lower than an effective series resistance of a porcelain capacitor that resonates at an rf frequency of said first electronic device.

9 canceled

10 canceled

11 (currently amended). A method for processing rf signals which comprises:

- a) rf connecting a baseband processing device and a solid-state electronic device;
- b) connecting said solid-state electronic device and said baseband processing device in dc series between a dc source terminal and an electrical ground;
- c) said ~~dc series-connecting step~~ dc series-connecting step comprises connecting a lower dc voltage terminal of one of said devices to a higher dc voltage terminal of an other of said devices;
- d) applying a dc source voltage to said dc source terminal;
- e) separately proportioning first and second percentages of said dc source voltage to said devices;
- f) rf decoupling said devices; and
- g) said rf decoupling step comprises connecting a capacitor between said lower dc voltage terminal of said one device and said electrical ground.

12 (currently amended). A method for processing rf signals which comprises:

- a) rf connecting a baseband processing device to a ~~multiplier/upconverter~~ multiplier/up-converter;
- b) rf connecting said ~~multiplier/upconverter~~ multiplier/up-converter to a solid-state amplifying device;
- c) connecting said solid-state amplifying device and said baseband processing device in dc series with a dc source terminal and an electrical ground;
- d) said ~~dc series-connecting step~~ dc series-connecting step comprises connecting a lower dc voltage terminal of said solid-state amplifying device to an rf choke, and connecting said rf choke to a higher dc voltage terminal of said baseband processing device;
- e) applying a dc source voltage to said dc source terminal;

f) proportioning first and second percentages of said dc source voltage to separate ones of said devices;

g) rf decoupling said solid-state amplifying device and said baseband processing device; and

h) said rf decoupling step comprises connecting a capacitor between said lower dc voltage terminal and said electrical ground.

13 (currently amended). Electronic apparatus ~~(90, 96, or 100)~~ (90, 96, 100, 108, 118, or 122) as claimed in Claim 1 in which said other electronic device comprises a processing electronic device (92).

14 (currently amended). Electronic apparatus (108, 118, or 122) as claimed in Claim 1 in which said other electronic device comprises a ~~baseband processor~~ baseband processing device (110).

15 (currently amended). Electronic apparatus (108, 118, or 122) as claimed in Claim 1 in which said other electronic device comprises a ~~multiplier/upconverter~~ multiplier/up-converter (112).

16 (currently amended). Electronic apparatus ~~(90, 96, or 100)~~ (90, 96, 100, 108, 118, or 122) as claimed in Claim 2 in which said second electronic device comprises a processing electronic device (92).

17 (currently amended). Electronic apparatus (108, 118, or 122) as claimed in Claim 2 in which said second electronic device comprises a ~~baseband processor~~ baseband processing device (110).

18 (currently amended). Electronic apparatus (108, 118, or 122) as claimed in Claim 2 in which said second electronic device comprises a ~~multiplier/upconverter~~ multiplier/up-converter (112).

19 canceled

20 canceled

21 (previously presented). Electronic apparatus (108, 118, or 122) as claimed in Claim 5 in which said means for rf decoupling further comprises means (86) for making an effective series resistance, between said lower dc voltage terminal of said one electronic device and said electrical ground, lower than a porcelain capacitor that resonates at an rf frequency of said one electronic device.

22 (currently amended). Electronic apparatus ~~(90, 96, or 100)~~ (108, 118, or 122) as claimed in Claim 6 in which said means for rf decoupling further comprises means (86) for making an effective series resistance, between said lower dc voltage terminal of said ~~solid-state electronic device~~ solid-state amplifying device and said electrical ground, lower than a porcelain capacitor that resonates at an rf frequency of said ~~one electronic device~~ solid-state amplifying device.

23 (new). Apparatus (48, 66, 70, 82, 90, 96, 100, 108, 118, or 122) as claimed in Claim 1 in which said apparatus further comprises means (54, 72, or VD1) for selectively and inversely proportioning a dc source voltage to said electronic devices (Q1, Q2, Q3, Q4, Q5, Q6, Q11, Q12, 92, 110, or 112).

24 (new). Electronic apparatus (30, 38, 108, 118, or 122) as claimed in Claim 1 in which said electronic devices (Q1 and Q7, Q1 and 110, Q3 and 110, Q5 and 110, or Q1 and 112) are connected in rf series.

25 (new). Electronic apparatus (30, 38, 90, 96, 100, 108, 118, or 122) as claimed in Claim 1 in which said apparatus further comprises means (R7, R15, R16, Q8, Q11, Q12, 110, or 112) for increasing current flow through one of said electronic devices (Q1, Q2, Q3, Q5, 92, 110, or 112) without increasing current flow through an other of said electronic devices (Q1, Q2, Q3, Q5, 92, 110, or 112).

26 (new). Electronic apparatus (30, 38, 108, 118, or 122) as claimed in Claim 1 in which said apparatus further comprises means, comprising a third electronic device (Q8, Q11, Q12, 110, or 112), for increasing current flow through one of said electronic devices (Q1, Q2, Q3, or Q5) without increasing current flow through an other of said electronic devices (Q7, Q11, Q12, 110, or 112).

27 (new). Electronic apparatus (30, 38, 108, 118, or 122) as claimed in Claim 1 in which said apparatus further comprises means, comprising a resistor (R7, R15, or R16), for increasing current flow through one of said electronic devices (Q1, Q2, Q3, Q5, Q11, Q12, 110, or 112) without increasing current flow through an other of said electronic devices (Q1, Q2, Q3, Q5, Q8, Q11, Q12, 110, or 112).

28 (new). Electronic apparatus (30, 38, 108, 118, or 122) as claimed in Claim 1 in which said apparatus further comprises a third electronic device (Q8, Q11, Q12, 110, or 112) that is connected in dc parallel with one of said electronic devices (Q7, Q11, Q12, 110, or 112); and

two of said electronic devices (Q1 and Q7, Q1 and 110, Q3 and 110, Q5 and 110, Q1 and 112, Q1 and Q11, or Q1 and Q12) are connected in rf series.

29 (new). Electronic apparatus (108, 118, or 122) as claimed in Claim 5 in which said devices (Q1 and 110, 112, Q11, or Q12) are connected in rf series.

30 (new). Electronic apparatus (108, 118, or 122) as claimed in Claim 5 in which said apparatus further comprises means (R15, R16, Q11, Q12, 110, or 112) for increasing current flow through one of said devices (Q1, Q11, Q12, 110, or 112) without increasing current flow through an other of said devices (Q1, Q11, Q12, 110, or 112).

31 (new). Electronic apparatus (108, 118, or 122) as claimed in Claim 5 in which said apparatus further includes means, comprising a third electronic device (Q11, Q12, or 112) for increasing current flow through one of said devices (Q1) without increasing current flow through an other of said devices (110).

32 (new). Electronic apparatus (108, 118, or 122) as claimed in Claim 5 in which said apparatus further includes means, comprising a resistor (R15 or R16) for increasing current flow through one of said devices (Q1 or 110) without increasing current flow through an other of said devices (Q1 or 110).

33 (new). Electronic apparatus (108, 118, or 122) as claimed in Claim 5 in which said apparatus further comprises a third electronic device (Q11, Q12, or 112) that is connected in dc parallel with one of said devices (110); and two of said devices (Q1 and 110, Q1 and 112, Q1 and Q11, or Q1 and Q12) are connected in rf series.

34 (new). A method as claimed in Claim 11 in which said method further comprises increasing current flow through one of said devices without increasing current flow through an other of said devices.

35 (new). A method as claimed in Claim 11 in which:

a) said method further comprises increasing current flow through one of said devices without increasing current flow through an other of said devices; and

b) said increasing step comprises connecting a resistor in parallel with said other device.

36 (new). A method as claimed in Claim 11 in which:

a) said method further comprises increasing current flow through one of said devices without increasing current flow through an other of said devices; and

b) said increasing step comprises connecting a third device in parallel with said other device.

37 (new). A method as claimed in Claim 11 in which said method further comprises:

- a) connecting a third device in parallel with one of said devices; and
- b) connecting said third device in rf series with said baseband processing device and said solid-state electronic device.